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DISCLOSURE TEXT:

Described is a new kind of automatic electronic circuit protector/circuit breaker which is used as an energy limiting device. - In the past, hydraulic/magnetic circuit protectors were employed for overcurrent protection in power supplies of data processing equipment and printers. They operate more accurately than fuses, can be easily reset without exchanging any component and are used as high-side switches in the positive outputs of power supplies. - With the introduction of switch mode power supplies, overcurrent protection means have been placed for simplicity in the return leads of outputs to be protected. - For a new product it was necessary to protect operator-accessible contacts under power such that the available continuous energy is limited to less than 240 VA, as specified in IEC950. As the associated power supplies have their own overcurrent protectors typically placed as low-side switches in the return leads, the current could only be con trolled on the high-side of the energy limiting circuit. In addition, it was necessary to send an error message from the high-side circuits to the power controller via ground referenced TTL circuits. Corresponding ground referenced TTL signals from the power controller are used to turn the high-side circuits of the energy limiting circuit on or off. - The problem was solved by using a commercially available integrated circuit module which includes circuits to shift ground referenced signals to high-side circuits and vice versa. The integrated circuit module contains a MOS gate driver to control a power FET and current sense comparators and latches to hold status conditions. However, a disadvantage of this module is the high tolerance of the internal current sense comparator. For turning off the power FET, the sensi tivity of this comparator varies between specimens from 155 to 320 mV, the sense voltage from a current sense resistor. This is an unaccept ably wide range. - The described approach provides additional floating circuits referenced to the high-side of the voltage to be controlled. The additional circuits contain a comparator with a low switching tolerance, which can be adjusted to any required turn-off current. The time constant of the comparator output components defines the turn-off time during overcurrent events. The turn-off signal is always sufficiently high to turn off MOS gate drivers with a high turn-off tolerance. - For hard shorts with currents exceeding 25 A, a separate current path is provided which controls the MOS gate driver directly. The turn-off time for this type of overload is controlled by a separate capacitor connected to the output

of the MOS gate driver. - The floating voltage required may be generated from a ground referenced voltage by a charge pump. - The turn-off characteristics may be easily modified by changing some components. Three operational modes are possible: o turn-off at a specified current (e.g., at 20 ms); o turn-off at overcurrents (e.g., at 20 ms); o turn-off at hard shorts (e.g., at 2.5 ms).